Date: February 1, 2016
Subject: Comments on Draft Risk Assessment Guidance for Superfund (RAGS) Part D Tables for the Newark Bay Superfund Site
To: Eugenia Naranjo
Remedial Project Manager

From: Marian Olsen, EPA
Pam Rodgers, Battelle

As requested, the draft tables provided by Tierra for the Newark Bay Superfund Site have been reviewed by EPA. Based on this review, comments are provided below organized based on the Tables provided by Tierra. Also provided are revised risk assessment tables (Table 1 and Table 4) that contain acceptable receptors, routes of exposure, and exposure parameters for Tierra to incorporate into the baseline human health risk assessment (BHHRA).

New Jersey Department of Environmental Protection (DEP) was provided the opportunity to review EPA's comments on the Draft RAGS Part D Tables 1 & 4 submitted by Tierra. Comments received from DEP are provided as Attachment 1 as a courtesy to Tierra. EPA does not feel it necessary that the specific receptors/exposures called out in DEP's comments be incorporated into the BHHRA, but rather EPA requests that sufficient site-specific, detailed human use characterization information be provided in the BHHRA to support receptor/exposure selection. It is anticipated that information contained in the NBSA Reconnaissance Survey Report (Tierra, 2015), as well as information obtained by Tierra from city and community organizations who utilize the bay, will be provided in the BHHRA to support selection of receptors/exposures as well as to justify elimination of certain other receptors/exposures.

Tierra Response
Detailed information discussing human use specific to Newark Bay, as well as receptor selection, will be provided in the BHHRA. Per NJDEP's comments, volunteer cleanup activities will be discussed as well. As part of Tierra's June 2013 Newark Bay Study Area Problem Formulation Document (PFD), a desktop evaluation of potential recreational, diving, and hunting use of the NBSA was conducted by contacting city and county parks and recreation departments, boating companies, and government agencies. This information will be reviewed, along with any new information, and included in the BHHRA.

General Comments:
The current document submitted by Tierra only provides summary Tables without supporting documentation that is important to understanding the characterization of the parameters provided in the Tables. Therefore, these comments are to be considered preliminary and will not be finalized until additional information is provided to support the values listed in the tables.

Tierra Response
The BHHRA text will provide discussion and documentation of the exposure parameters, as this information is not typically part of RAGS D tables.

Probabilistic Risk Assessment

Tables including distributions for a number of exposure parameters were submitted along with the point estimates. At this point in the Remedial Investigation, it is premature to make a decision regarding whether a Probabilistic Risk Assessment (PRA) will be conducted. Consistent with the Risk Assessment Guidance for Superfund (RAGS) Volume III, Part A, Section 1.4.1.(1) states:

> This guidance recommends that a point estimate risk assessment be conducted in the first tier after completing the remedial investigation (RI) planning, site scoping, problem formulation, data collection, and the development of a site conceptual model. In general, when site decision making would benefit from additional analysis beyond the point estimate risk assessment, and when the risk manager needs more information to complete the RI/FS process, the risk manager would proceed to higher tiers. Sensitivity analysis should be conducted in each tier to guide decisions regarding data collection and the complexity of the analysis needed to characterize variability and/or uncertainty in risk. Sensitivity analysis can also play an important role in risk communication by supporting decisions to continue characterizing less influential variables with point estimates in higher tiers.

Consistent with guidance, before a decision can be made regarding conducting a PRA, it is important to complete the RI and develop a site conceptual model, have discussions with the risk managers regarding the need for a PRA, and develop a sensitivity analysis to determine the appropriate parameters and exposure pathways to evaluate. At this time EPA is not ready to make a determination regarding the need for conducting a PRA on Newark Bay. It is anticipated that if a PRA were to be conducted it will be limited to the ingestion of fish pathway based on anticipated results from the risk assessment.

Tierra Response

Responses to the PRA-related comments were discussed during a conference call between Tierra and USEPA on March 16, 2017; a decision from USEPA is pending. The RTCs will be amended once Tierra receives direction from USEPA.

Table 1. Conceptual Site Model

1. The columns titled, “Primary source Medium” and “Secondary Source Medium” in Table 1 are not consistent with RAGS Part D. This information would be more appropriately discussed in text supporting the RAGS Part D Table 1 series. As currently presented, the range of exposures sources are not identified and it is not clear how they contribute to the exposure medium. It is recommended that original RAGS Part D Table format be used.

   Tierra Response

   Agree; this change will be made.

2. *Receptors*. A worker receptor was not included. Workers may be tasked with collecting shoreline trash or other work that leads to contact with sediment along the Bay. Inhalation

may occur if activities are conducted on the mudflat areas and volatiles are present. Contact with surface water is not typically expected to occur under the worker scenario. Please add the worker receptor to the evaluation.

Tierra Response
The worker scenario will be added.

3. *Receptor Age*. Please include age groups for each of the receptors: Child (1 to <7 years old); Adolescent (7 to <19 years old); Adult (>18 years old) consistent with the assessment for the LPRSA 17 Mile Study Area.

   Tierra Response
   Current age groupings will be adjusted to accommodate USEPA's request.

4. *Current and Future Exposure to Fish and Crabs*. The text indicates that it: "Assumes receptor and family members consume fish caught from NBSA" and this statement requires clarification regarding fishing licenses requirements, fish advisories in place, and that adults and adolescents may share fish/crabs with family members, especially young children. The text for the rationale also needs to highlight the potential for consumption of fish and crabs under current and future conditions.

   Suggested language for rationale for fish consumption: Site-related contaminants have been detected in fish. Studies have found that despite Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters, individuals do fish in Newark Bay and consume fish. This pathway assumes the receptor will consume fish caught from Newark Bay and share it with family members.

   Tierra Response
   Agree; the suggested language will be incorporated.

   Suggested language for rationale for crab consumption: Site-related contaminants have been detected in crabs. Studies have found that despite Health Advisories for Eating Fish and Crabs in New Jersey Waters, individuals do crab in the Newark Bay area and consume crabs. This pathway assumes the receptor will consume crabs caught from Newark Bay and share it with family members.

   Tierra Response
   Agree; the suggested language will be incorporated.

5. *Transient Exposures.* The discussion of the transient exposures requires further clarification indicating that potential exposures may be less frequent than for the Angler/Sportsman and this pathway was evaluated qualitatively.

Suggested language for rationale Evidence of homeless camps has been observed in the Newark Bay study area. Limited exposure pattern data would make quantification highly uncertain. Potential risks relative to other receptors are discussed in the uncertainty section.

Tierra Response
Agree; the suggested language will be incorporated.

6. *Current and Future Exposures to Waterfowl*. The discussion needs to further clarify the limitations of the data. The New Jersey Division of Fish and Wildlife, Bureau of Law Enforcement indicated that they have not observed anyone hunting in the NBSA. These data collectively indicate that hunting in this area is not likely to occur, and hunters do not frequent the area. Ingestion of waterfowl and animals other than fish/crabs is likely to be minimal. This topic will be further discussed in the Uncertainty Section of the HHRA. In addition, the rational text needs to explain why this pathway is not being quantified in the assessment. Suggest also addressing ingestion of animals (e.g., turtles, clams) other than Newark Bay fish/crabs likely to be minimal.

   Tierra Response
   Agree; this information will be added.

7. *Exposures to Sediment*. Exposures to sediment needs to combine the exposures for each of the receptors e.g., ingestion and dermal contact. There is no need to list each as separate line item in the table. The table needs to be updated to indicate that the sediment exposed to is "accessible" sediment along the banks of the bay. In addition, the young child receptor would not be expected to accompany the adult while fishing based on safety concerns; therefore, exposure to sediment and surface water for the child angler/sportsmen does not need to be included in the risk evaluation. Rationale for the table for the child receptor is provided below.

   Suggested language for rationale: Angler may contact sediment while fishing or crabbing from the banks of the Bay. It is assumed that the young child (1 to <7 years) would not typically accompany adult anglers due to safety concerns. Inhalation may occur if activities are in mudflat areas and volatiles are present, however, this pathway is not considered further in the BHHRA because the inhalation pathway risks are negligible.

   Tierra Response
   Agree; the changes discussed above will be made.

8. *Recreational User*. Further, the text needs to identify and explain the recreational activities where the recreator may be exposed to surface water, sediment, etc. in the Bay in greater detail e.g., swimming, wading, sculling, boating, etc. The text needs to explain areas in the Bay where these activities may be occurring e.g., throughout the Bay, in specific areas along

the shore, etc. It may be helpful to contact local sculling clubs, etc. for information on these activities to further identify the frequency, age range, and other exposure characteristics.

Tierra Response
As discussed above, as part of Tierra's June 2013 Newark Bay Study Area PFD, a desktop evaluation of potential recreational use of the NBSA was conducted by contacting city and county parks and recreation departments, boating companies, and government agencies to characterize recreational activities, such as boating, sail boating, jet skiing, canoeing, and kayaking. A summary of the findings is included in the PFD, and the entities contacted are listed in Appendix D. This information will be reviewed, along with any new information, and included in the BHHRA.

While some additional information will be added to the RAGS D Table 1, this information will be largely discussed in the BHHRA text.

9. *Ambient Air*. The rationale for the ambient air pathway needs to further clarify the areas where exposure to contaminants from the Bay in ambient air may occur e.g., flood plains, shoreline, etc. In addition, the rationale needs to indicate whether the concentrations in air will be measured or modeled.

   Tierra Response
   This information will be added. However, USEPA's revised Table 1 does not include ambient air as an exposure medium, and instead groups inhalation under surface water and sediment. The ambient air/inhalation portions of Table 1 will be modified according to USEPA's example.

10. *Surface Water*. The text is unclear regarding why exposures to surface water and sediment were separated since the individual is consuming either fish or crab. The basis for separating these exposures needs to be clarified. It is also recommended that the exposures to surface water and sediment be combined to a single exposure rather than separating the two as presented in the current table.

    Tierra Response
    For the angler/sportsman scenario, USEPA's revised Table 1 contains only a single entry, each, for fish and crabs, with the medium designated as "fish tissue." There is no separate contribution from sediment or surface water.

    Table 1 will be modified to reflect USEPA's single entry, each, for fish and crabs, with the medium designated as "fish tissue," with no contribution from sediment or surface water. The contributions from other media will be shown in the conceptual site model figure.

11. *"Potentially" Complete Pathway*. Either the exposure pathway is complete or not complete. The text needs to remove the term "potentially" complete to describe the exposure pathway.

If the pathway is complete provide a rationale for why. Conversely, if the pathway is not complete, provide a rationale for not quantifying the exposures.

Tierra Response
This change will be made.

12. *Resident Receptor*. Please add adult and child resident receptors to the table for exposures to sediment and surface water under a qualitative type of analysis.

Tierra Response
This addition will be made.

Table 4. **Values Used for Daily Intake Calculations**

Fish and crab consumption

- Under ingestion rate, fraction from source for the CTE individual should be 1 consistent with the 17 mile Study Area.

  Tierra Response
  This change will be made.

- The Exposure Frequency should be 365 days/year consistent with the annualized fish and crab ingestion rate.

  Tierra Response
  This change will be made.

- The Exposure Duration for the adult is 20 years consistent with a residential exposure of 26 years with 20 years as an adult and 6 years as a child. The CTE value for residents is a total of 9 years for an adult and child consistent with EPA's RAGS Part A document. The 9 years includes 6 years as a child and 3 years as an adult.

  Tierra Response
  These changes will be made.

- The Cooking Loss percentages will need to be updated to reflect any new studies that have been conducted.

  Tierra Response
  Cooking loss information will be reviewed for any new studies, and any new information will be incorporated.

Angler exposure to sediment

- The text will need to clarify the basis for the relative bioavailability factor with appropriate references to EPA guidance available at: https://www.epa.gov/superfund/soil-bioavailability-superfund-sites-guidance. Currently, arsenic is the only chemical with a bioavailability value.

  Tierra Response
  The Table 4s reference the current 2016 USEPA RSLs for the relative bioavailability factor for sediment, which in turn references the guidance specified above. It is agreed that arsenic is the only compound with a bioavailability value other than 1.

- Use an Adherence Factor of 0.3 consistent with the LPRSA 17 mile Study Area; the value should be rounded to one figure consistent with RAGS Part E.

  Tierra Response
  This change will be made.

- Exposure Duration – consistent with the LPRSA HHRA it is recommended that the assumption of 6 years as a child and 20 years as an adult and 12 years as an adolescent. Adult and child are combined.

  Tierra Response
  The current RAGS D Table 4s and intended cancer risk calculations assume an age-adjusted scenario. However, the approach will be changed to add risks for child and adult for cancer risk, like the LPRSA BHHRA, instead of pursuing age-adjusted calculations.

- The exposure factors for skin surface area, adherence factors, and surface water ingestion rate, etc. are not consistent with those used in the LPRSA 17 mile Study area. These values need to be consistent or information provided regarding why the same values are not being used (refer to the revised Table 4 provided along with these comments).

  Tierra Response
  These values will be incorporated.

Mutagenic Mode of Action

The tables provide calculations for the Mutagenic Mode of Action. It is important to identify which chemicals will be evaluated as having a mutagenic mode of action based on IRIS assessment and other sources identified in the text.

Tierra Response
Chemicals currently identified by USEPA as having a mutagenic mode of action are designated as such in the USEPA RSL tables. These are also discussed in the IRIS assessments and other USEPA documents.

These chemicals will be identified as mutagens in the RAGS D Table 5s and 6s, and will also be discussed in the BHHRA text.

Recreational Exposures – Adult, Adolescent and Child

- In the absence of text it is unclear what activities are anticipated under this category. Understanding these activities will inform the exposure factors presented.

  Tierra Response
  As submitted, the recreator scenarios generally mirror the default recreational soil/sediment and surface water scenarios and default factors presented in the USEPA RSL tables. However, the recreator scenarios will be changed per USEPA's revised Table 4 to have individual evaluations for wader, swimmer, and boater scenarios.

- The Oak Ridge National Laboratory exposure values are not appropriate since they were not developed or selected by EPA.

  Tierra Response
  In the original Table 4 submitted by Tierra, it was proposed that the exposure frequency (EF) for a recreator would be 75 d/yr for RME and 38 d/yr for CTE and that exposure would occur via surface water and contact with sediment. Tierra did not propose different types of recreators (e.g., boater, wader). Tierra proposed the Oak Ridge National Laboratory (ORNL) default values for a recreator (contact with sediment) as reasonable estimates of EF from another governmental authority because the USEPA RSL tables do not include values for recreator exposure frequency, exposure time, or event frequency. However, in its revision to Table 4, USEPA inserted three types of recreational activities (boating, swimming and wading), each of which requires exposure estimates. In general, exposure values for these types of recreational activities will be replaced by those recommended by USEPA in the revised Table 4. Note, however, Tierra disagrees with the USEPA suggested recreational EF for surface water boating. The recreational EF values in USEPA's revised Table 4 are the same as those used in the LPRSA BHHRA and the adult and adolescent values are high for surface water boating exposure. For example, for adults, EF is 259 d/yr (7 days/week for 37 weeks) for RME and 111 d/yr (3 days/week for 37 weeks) for CTE. According to the LPRSA BHHRA, the values are based on the rowing season/frequency for Passaic River boating clubs. Based on research conducted for the PFD, unlike the Passaic, there is very little recreational boat/kayaking activity in Newark Bay, largely due to the ship traffic. Therefore, the boating exposure frequencies assumed for surface water in the LPRSA BHHRA are overly conservative for Newark Bay.

Instead of using the very high estimates of EF for adult and adolescent surface water boating, Tierra proposes to utilize the ORNL value for recreator surface water contact of 45 d/yr for RME (and half that; 23 d/yr for CTE). For adult and adolescent sediment contact while boating, Tierra proposes to use the ORNL recreator sediment value of 75 d/yr for RME (and half that, 38 d/yr, for CTE).

- See previous discussion regarding exposures assumptions and needed updates.

  Tierra Response
  These changes will be made.

Attachment 1

NJDEP Comments